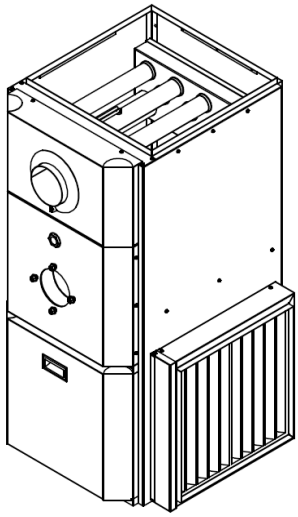
Installation, Operation and Service Manual

KHM SERIES

85% + EFFICIENCY
OIL FIRED HI-BOY FURNACE

KHM-1 / 090
KHM-2 / 140



KHM-1 / 090 Illustration

INSTALLATIONS MUST MEET ALL LOCAL AND FEDERAL CODES THAT MAY DIFFER FROM THIS MANUAL

Please read the manual in its entirety before beginning installation. This manual must be kept with the furnace for future reference.

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11-09-2012 **G2012-E2 Rev. C**

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1.0 IMPORTANT SAFETY ADVICE

Please read and understand this manual before installing, operating or servicing the furnace. To ensure you have a clear understanding of the operating procedures of the appliance please take the time to read the **IMPORTANT SAFETY ADVICE section** of this manual.

WARNINGS

NEVER burn garbage or paper in the unit.
NEVER store combustible material around it.
DO NOT attempt to start burner when excess oil has accumulated, when unit is full of vapour or when heat exchanger is very hot.
DO NOT use gasoline, crankcase drainings or any oil containing gasoline.

CAUTION

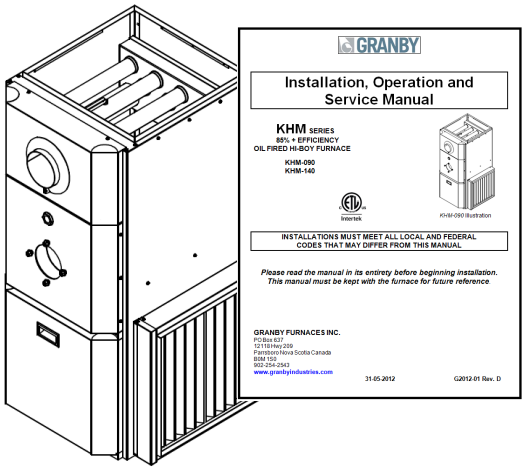
DO NOT START THE BURNER UNTIL ALL FITTINGS, COVERS AND DOORS ARE IN PLACE. **DO NOT** TAMPER WITH THE FURNACE OR CONTROLS, CALL A QUALIFIED BURNER TECHNICIAN. **DO NOT** STORE OR USE GASOLINE OR OTHER FLAMMABLE VAPOURS AND LIQUIDS IN THE VICINITY OF THIS UNIT OR ANY OTHER APPLIANCE.

DANGER

Do not use this furnace as a construction heater. Use of this furnace as a construction heater exposes it to abnormal conditions, contaminated combustion air and lack of air filtering. Failure to follow this warning can lead to premature furnace failure which could result in a fire hazard and/or bodily harm and/or materials damages.

IMPORTANT

This manual contains instructional and operational information for the KHM OIL-FIRED FURNACE. Read the instructions thoroughly before installing furnace or starting the burner. Consult local authorities about your local FIRE SAFETY REGULATIONS. All installations must be in accordance with local state or provincial codes. Improper installation will result in voiding of warranty.


GRANBY
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GRANBY FURNACES INC.
31-05-2012
G2012-01 Rev. D

2.0 PRODUCT INFORMATION

CLEARANCE (minimum) TO COMBUSTIBLES
UPFLOW POSITION

Top & Sides of Supply Plenum	1”	(25 mm)
Front (Maintenance)	24”	(610 mm)
Rear	0”	(0 mm)
First Side	0”	(0 mm)
Other Side	0”	(0 mm)
Flue Pipe	9”	(229 mm)
Floor		Combustible

DOWNFLOW POSITION

Top	2”	(51 mm)
Bottom and Sides - Plenum	1”	(25 mm)
Rear	0”	(0 mm)
First Side	0”	(0 mm)
Other Side	0”	(0 mm)
Front (Maintenance)	24”	(610 mm)
Flue Pipe	9”	(229 mm)
Floor (with Down flow base)		Combustible

HORIZONTAL POSITION

Top	2”	(51 mm)
Bottom and Sides - Plenum	1”	(25 mm)
Rear	1”	(25 mm)
First Side	1”	(25 mm)
Other Side	1”	(25 mm)
Front (Maintenance)	24”	(610 mm)
Flue Pipe	9”	(229 mm)
Floor	2”	(51 mm)

DRAFT PRESSURE

Breech draft pressure	-0.01” wc minimum

AIR/BLOWER DATA

External static – Non A/C	0.2” wc
External static – A/C	0.5” wc
Maximum cooling	3.0 tons… KHM-1 / 090 5.0 tons… KHM-2 /140
Maximum air temperature rise	See page 16 and 33
High Limit, max design outlet temp	185℉
Thermostat anticipator	0.2 amps

MOTOR/BLOWER

KHM-1 / 090: 1/2 hp 4 Speed / G10-8 DD or 1/2 hp ECM / G10-8
KHM-2 / 140: 3/4 hp 4 Speed / GT12-10DD or 3/4 hp ECM / GT12-10

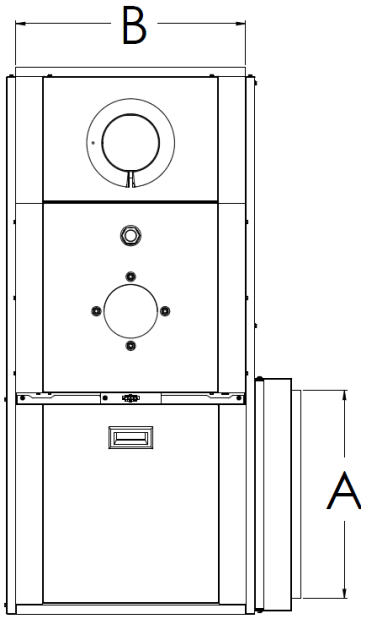
FAN/HIGH LIMIT CONTROL
Honeywell ST9103 Fan Center & Thermo-Disk (7” stem)

DIMENSIONS (KHM-1 / 090)

Depth	26”	(660 mm)
Height	46 1/4”	(1175 mm)
Width	21 7/16”	(545 mm)

DIMENSIONS (KHM-2 / 140)

Depth	30”	(762 mm)
Height	49 7/8”	(1267 mm)
Width	21 7/16”	(545 mm)



PLENUM DIMENSIONS (KHM-1 / 090)

Cold air return	(A)	18” x 18”	(457 x 457 mm)
Hot air supply	(B)	20” x 20”	(508 x 508 mm)

PLENUM DIMENSIONS (KHM-2 / 140)

Cold air return	(A)	23” x 18”	(584 x 457 mm)
Hot air supply	(B)	24” x 20”	(610 x 508 mm)

AIR FILTERS

KHM-1 / 090	20” x 20” x 2” non-pleated UL approved
KHM-2 / 140	25” x 20” x 2” non-pleated UL approved

A/C COIL LOCATION
Minimum height above the heat exchanger 6” (152 mm)

See A/C Coil Manufactures Requirements

SMOKE-PIPE CONNECTION
5” Chimney **or** direct vent DVS Granby kit

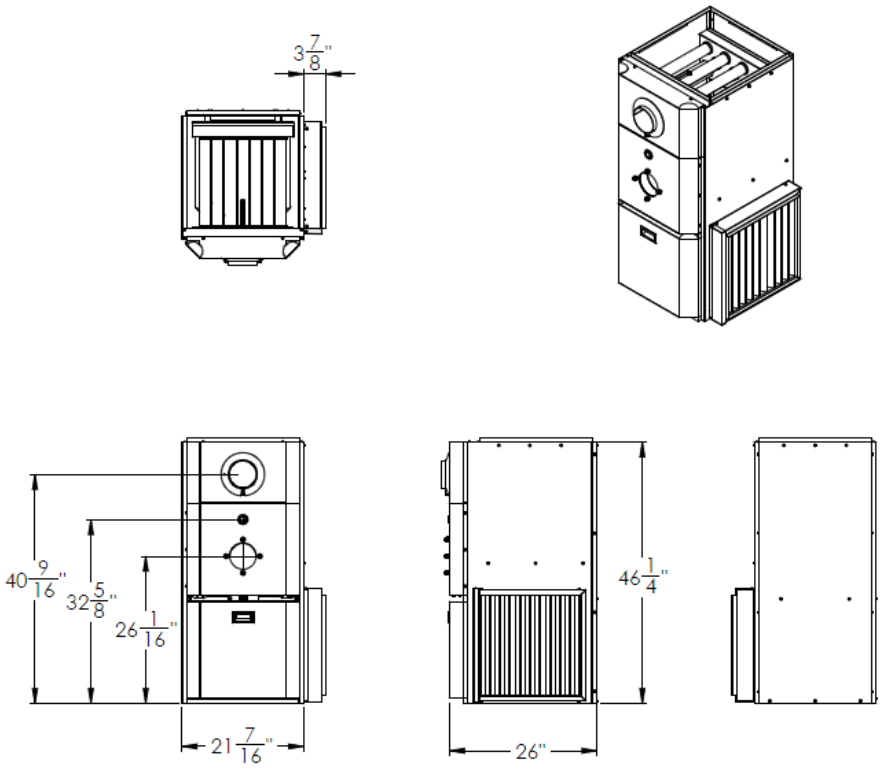
CLEANOUTS
Front Cover & Burner Opening

THERMOSTAT
Any thermostat

FUEL
Not heavier than No. 2 furnace oil.

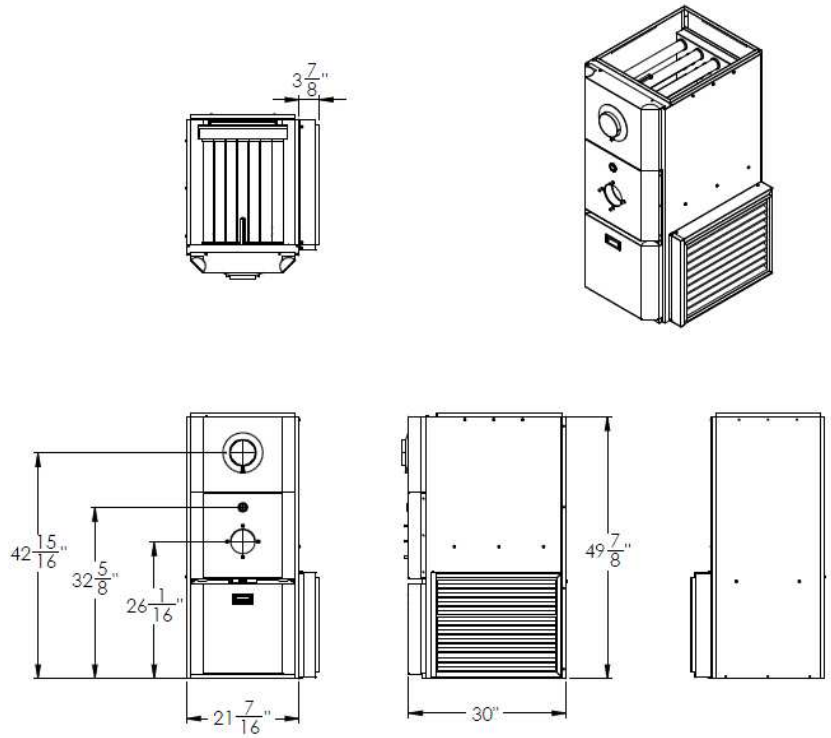
ELECTRICAL – 120 Volts, 60 Hz

Canada	Less than 12 amps.
USA	13.3 amps, circuit protection 20 amps.



KHM-1 / 090 - DIMENSIONS

Dimensions are in inches



KHM-2 / 140 - DIMENSIONS

Dimensions are in inches

3.0 FURNACE INSTALLATION

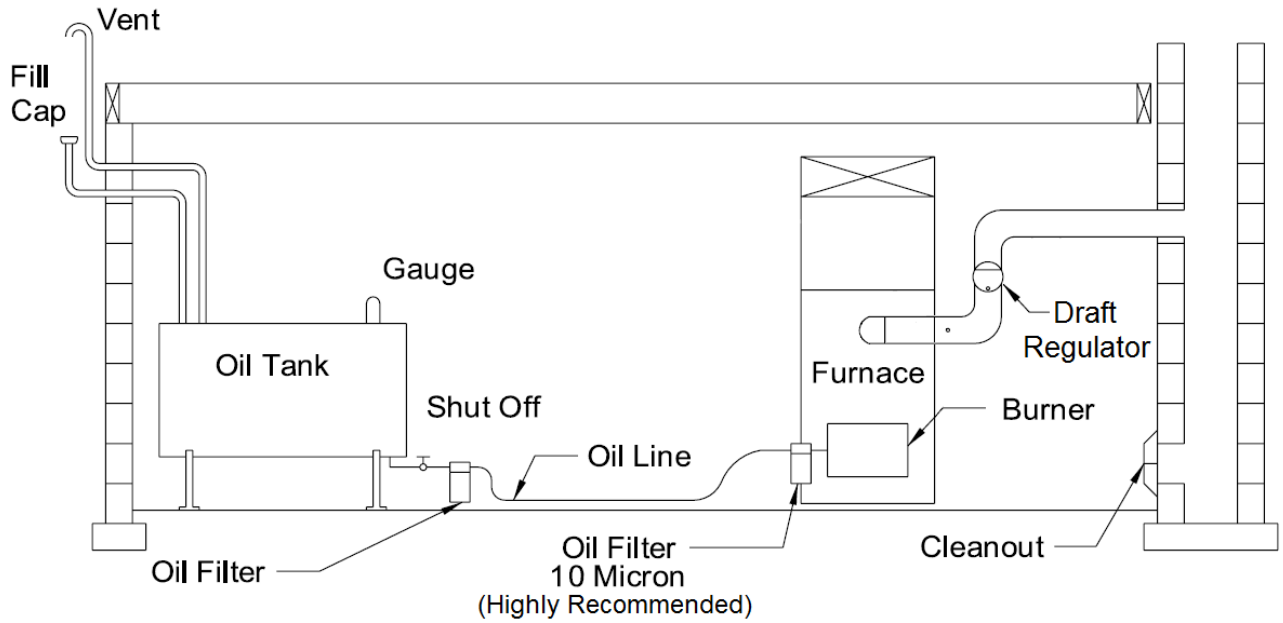
OIL TANK & PIPING

Tank installation must conform to local requirements.

Install according to the applicable code such as CSA B139 and NFPA 31. Minimize the number of connections in suction line and make all connections as tight as possible. Use a pipe joint compound suitable for oil on all pipe threads. To reduce possibility of air leaks, tighten stem packing gland nut on any valves installed in the suction line. Also, be sure the oil filter is tight, as filter gaskets often shrink. Check for kinks in the oil lines as well as for possible air pockets and for loose connections. Two filters as shown below are recommended. Optional tank gauge protectors and outlet protectors are available at your local dealer.

ONE PIPE SYSTEM Where the tank is above the burner and when the oil flows by gravity to the oil pump, a single-stage fuel unit with a single oil line to the pump may be used.

TWO PIPES SYSTEM When a single line is unsuitable, use a double line system or see your dealer for special oil line fittings. Install by-pass plug on burner fuel unit as specified in the burner manual.



Oil Tank and Piping

PLACEMENT & VENTING

Furnace installation shall conform to the required installation code for oil-fired equipment (USA: NFPA 31, Canada: CSA B139).

FLOOR SUPPORT COMBUSTIBLE – If required, support furnace on five (5) concrete blocks. Make sure the center of the furnace base is supported. Approved for installation on combustible floors in the upflow position and downflow position (with the optional sub-base). Not approved for installation on combustible floor in horizontal applications. For horizontal applications, use railing type support (not supplied) to keep the furnace in position. Make sure that all clearances are respected.

CHIMNEY/VENT Connect the furnace to a chimney/vent system of size and condition required by the NFPA 31 (USA) or CSA B139 (Canada) code. Furnace is approved for factory built chimney type "L" vents. Breech is certified for 5" vent pipe. Keep vent/flue pipe as short as possible with a minimum upward slope of ¼'' per foot. Vent/flue pipes MUST NOT pass through a ceiling. Maximum flue gas temperature is 575℉.

CONDENSATION **If you have condensation in your chimney, make sure that the chimney size is according to the tables in CSA B139 / NFPA 31. The temperature at the entrance of the chimney can be increased by insulating the flue-pipe between the furnace and the chimney base. If this is not sufficient, consider cutting or removing some flue baffles in the furnace. BE AWARE THAT REMOVING BAFFLES REDUCES THE UNIT EFFICIENCY AND A MODIFIED UNIT IS NO LONGER ENERGY STAR APPROVED.**

COMBUSTION & VENTILATION AIR Install openings and ductwork to the furnace room providing fresh outside combustion and circulation air for cooling the furnace casing, as installation code requires (USA NFPA 31, Canada CSA B139). If installed in a closed room, provide two free air ventilation openings of at least 8" x 12" (96 sq. in.) free flow area near ceiling and floor. Oil burners must have sufficient air to allow vent systems to operate properly.

DRAFT Use approved draft control supplied for 5" pipe. Set specified draft minimum pressure of -0.01" wc.

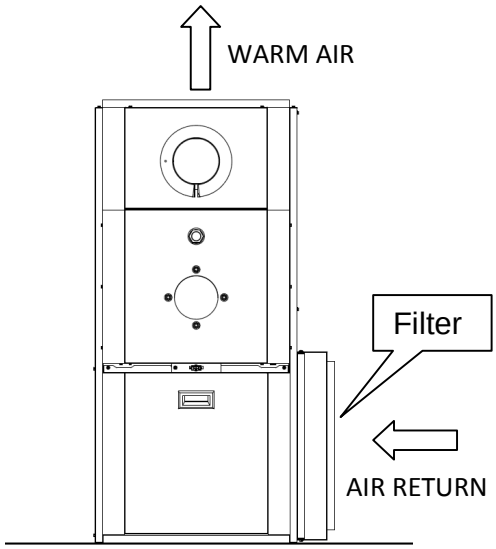
ELECTRICAL Wire according to the National Electrical Code (Canadian Electrical Code in Canada) or local codes. Use a separately fused #12 electrical line directly from the service panel to the furnace junction box. Install a manual shut-off switch at the door or stairway to furnace room so furnace can be shut off remotely.

CLEARANCES Before placing unit, review installation clearances as shown on furnace operating decal or section **PRODUCT INFORMATIONS**.

LOCATION Install the furnace close to chimney and central to ductwork.

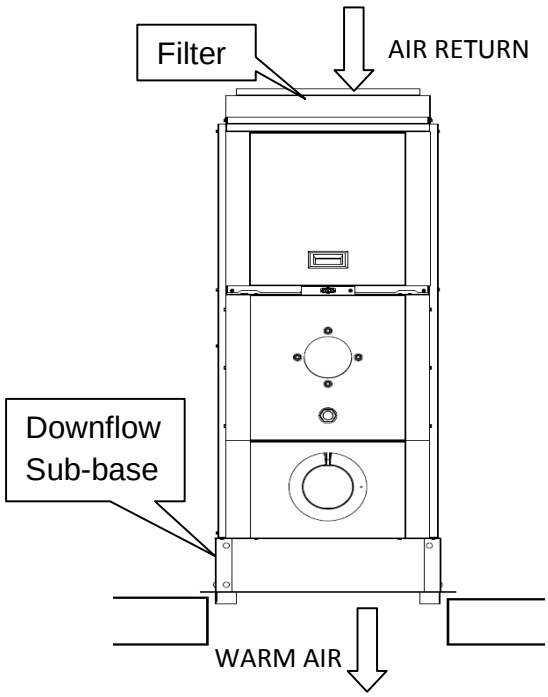
MULTI-POSITION CONFIGURATIONS

UPFLOW INSTALLATION



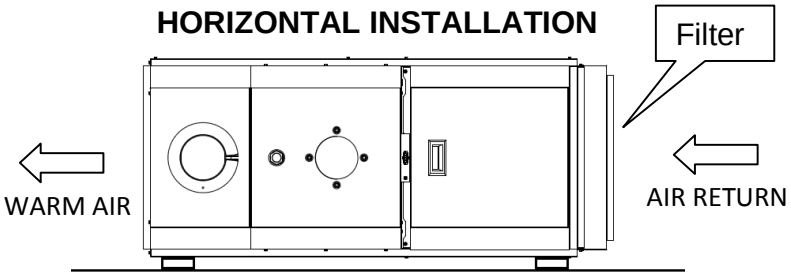
The return air opening can be located on left side or on the right side of the unit. After installing the filter rack supplied with the unit we recommend installing the blower door before handling the unit.

DOWNFLOW INSTALLATION



When the unit is installed in downflow configuration on a combustible floor, the clearance from combustible material must be respected. The downflow sub-base CAB-A0-0045-00 (for KHM-1/090) or CAB-A0-0046-00 (for KHM-2/140) can be used to ensure these clearances.

HORIZONTAL INSTALLATION



When the unit is installed in the horizontal configuration on a combustible floor with a choice of right or left air outlet, the clearance of (2'') from combustible material must be taken into consideration.

The burner must always be installed facing upwards regardless of the configuration installation.

For complete clearance information to combustibles, see PRODUCT INFORMATION, page 3.

4.0 ACCESSORY INSTALLATION

BLOCKED VENT SWITCH (BVSO) FOR CANADIAN APPLICATION ONLY

Oil-fired appliances installed in Canada require a blocked vent switch system when installed on a chimney. A safety switch is included with the furnace to perform this function. It is the installer's responsibility to install the switch in accordance with the instructions provided. Not applicable for Direct Vent systems. **Field Controls Model: WMO-1 (Manual Reset)**

Switch Operation
Blocked vent switches are flue gas safety devices for detecting spillage of flue gases due to a blocked flue or inadequate draft. After detecting a problem, the switch de-energizes the system's burner control.
NEVER reset the switch unless the cause of the blockage has been corrected.

Installation (Figure 1)
1) Drill a 5/8" hole in to the flue vent pipe near the appliance breech connection.
2) This hole must be before the draft regulator, vertically or horizontally.
3) Remove one of the securing nuts from the threaded tube of the safety switch.
4) Tighten the other securing nut onto the pipe as far as possible.
5) Insert the threaded tube end into the pierced hole of the flue vent pipe.
6) Install the securing nut on the safety switch tube, which protrudes into the flue vent pipe. Tighten the nut securely.

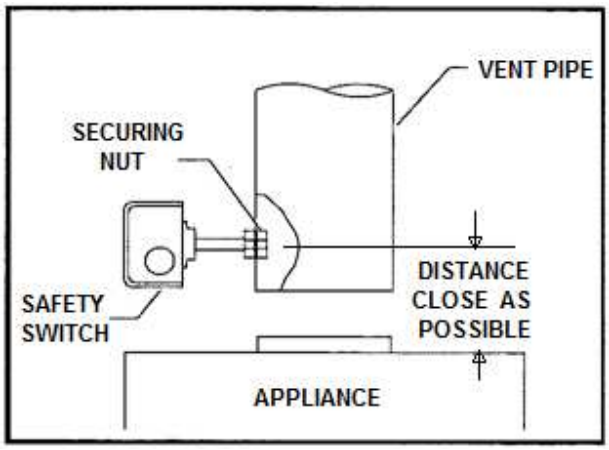


Figure 1- Illustration from the instruction manual of Field Controls

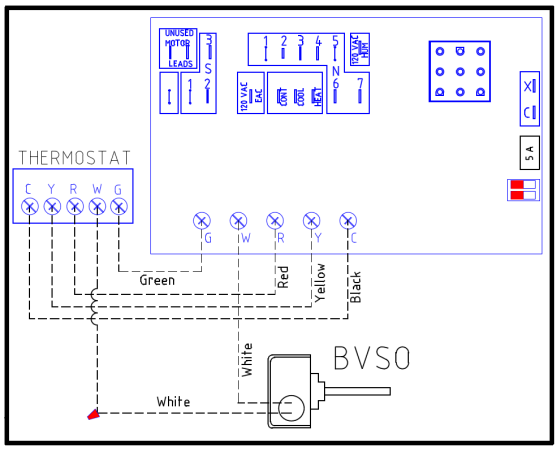


Figure 2- BVSO wiring diagram

Wiring Instructions (BVSO)
Caution: Disconnect the electrical power when wiring the unit.

Wire the blocked vent switch in accordance with The National Electrical Code and applicable local codes. Wire the safety switch (BVSO) in series with the thermostat and the fan timer relay control (Figure 2).

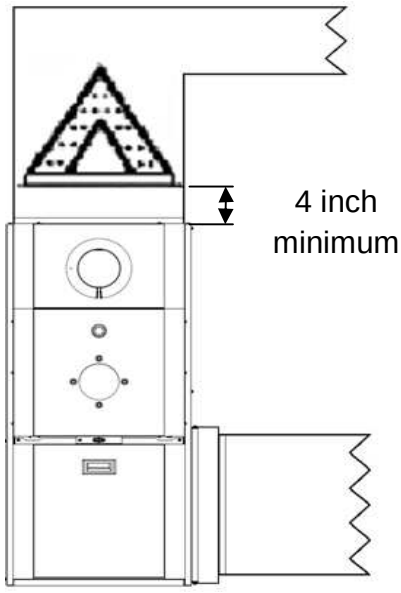
System Test Procedure (BVSO)

1) With the power re-established, block the chimney or vent pipe downstream of the switch.
2) Adjust the thermostat to call for heat.
3) Once the heating system has started the blocked vent switch should shut down the burner within 10 minutes or sooner.
4) Once the system has cooled, the blocked vent switch can manually be reset.
5) This procedure should be tested a second time.
6) After testing the blocked vent switch the chimney should be cleared of obstruction and the heating system should be tested over a long run cycle.

If the block vent switch shuts down the system, check to ensure there is enough draft in the chimney and venting pipes.

AIR CONDITIONING

An air conditioning coil may be installed on the supply side **only**. Coils installed on the return side will cause condensation on the heat exchanger; this will shorten the heat exchanger life and may cause products of combustion to enter the house. Wire as per wiring label and diagram. **Height of the coil above the unit supply shall be at least 4" (102 mm).**



See A/C coil Manufacturers Requirements.
To check the AC coil total air flow resistance,
see procedure at page 33.

HUMIDIFIER

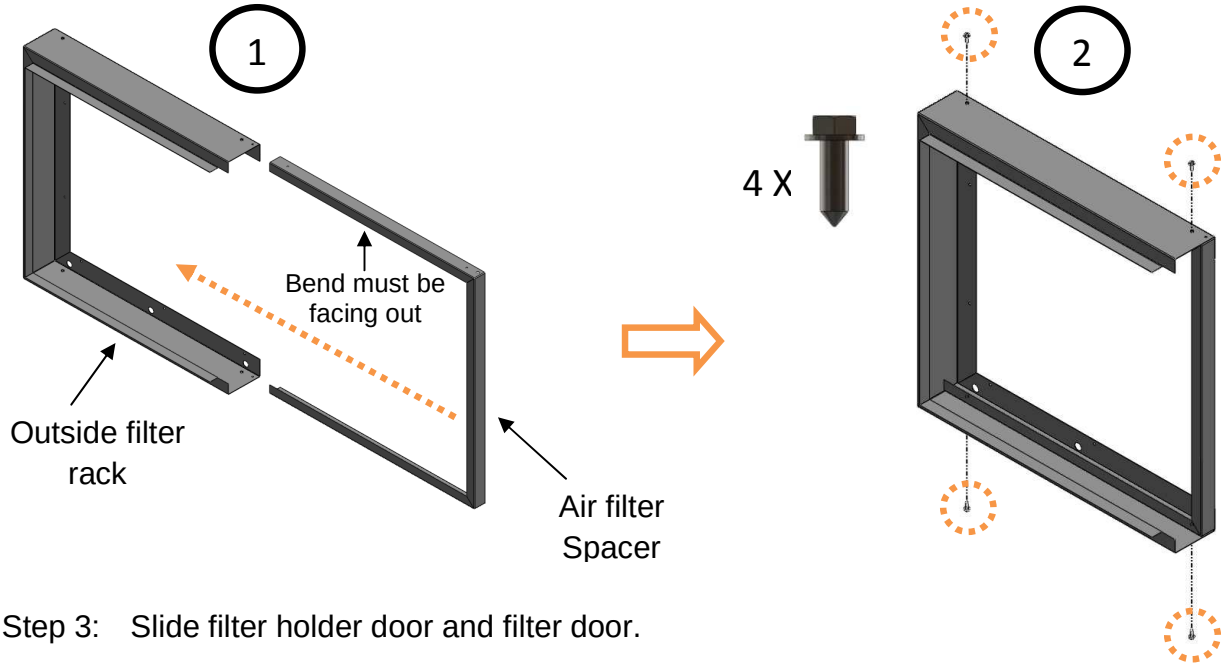
If a humidifier is installed ensure that no water can drip or run from it into the furnace. This would cause deterioration and void the furnace warranty.

AIR FILTER RACK INSTALLATION

The air filter rack is shipped uninstalled inside the furnace. This way the owner can install it in the position that he wants. There are 3 possible locations to install the air filter rack which are: bottom left side, bottom right side and under the furnace. Follow the instructions below to install the air filter support properly.

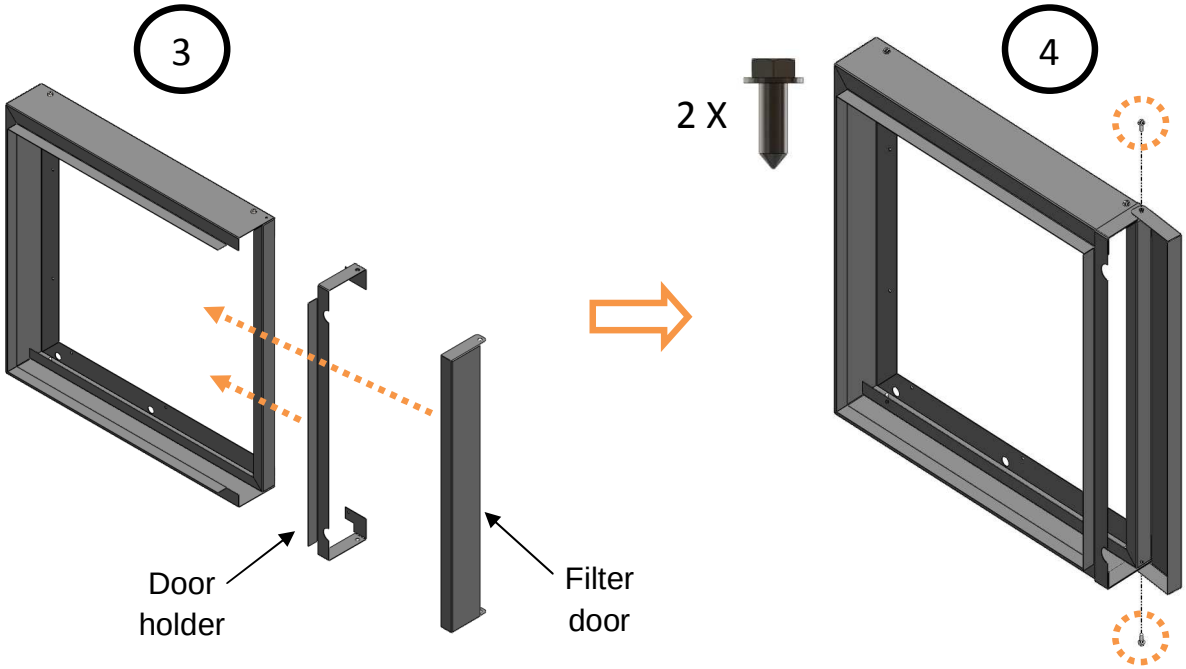
Step 1: Slide air filter spacer inside the outside filter rack.

Step 2: Screw in the 4 screws to hold these two parts together.



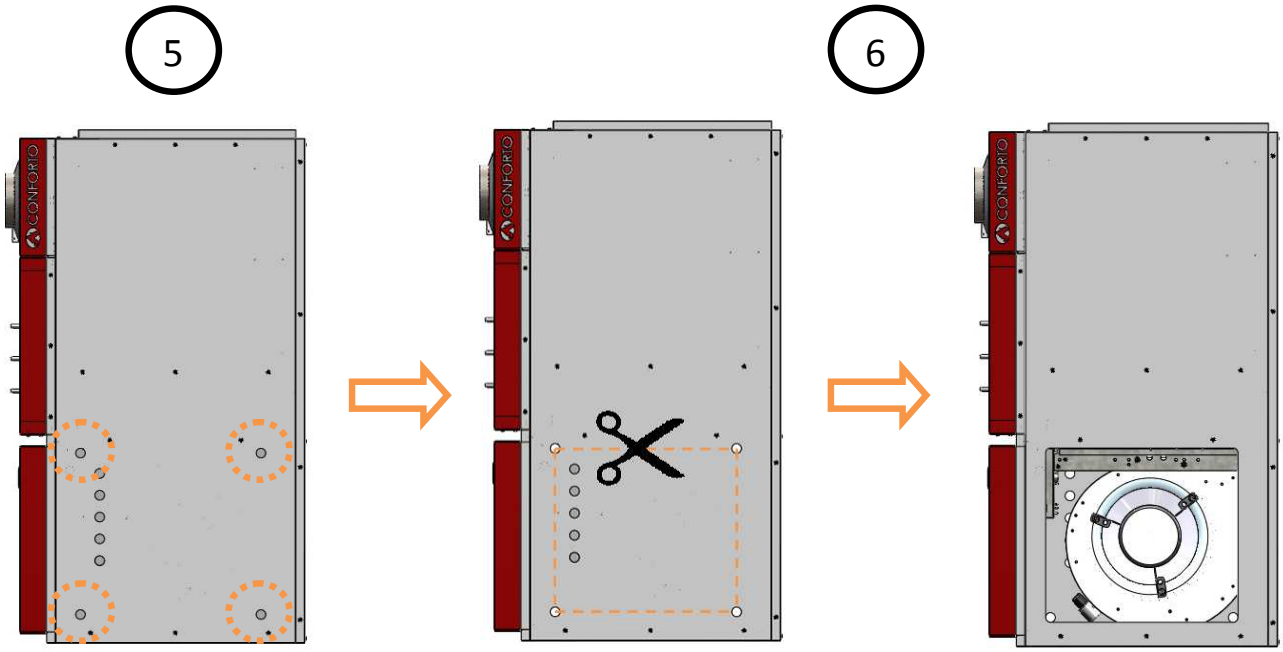
Step 3: Slide filter holder door and filter door.

Step 4: Use the 2 remaining screws to maintain the filter door in place.



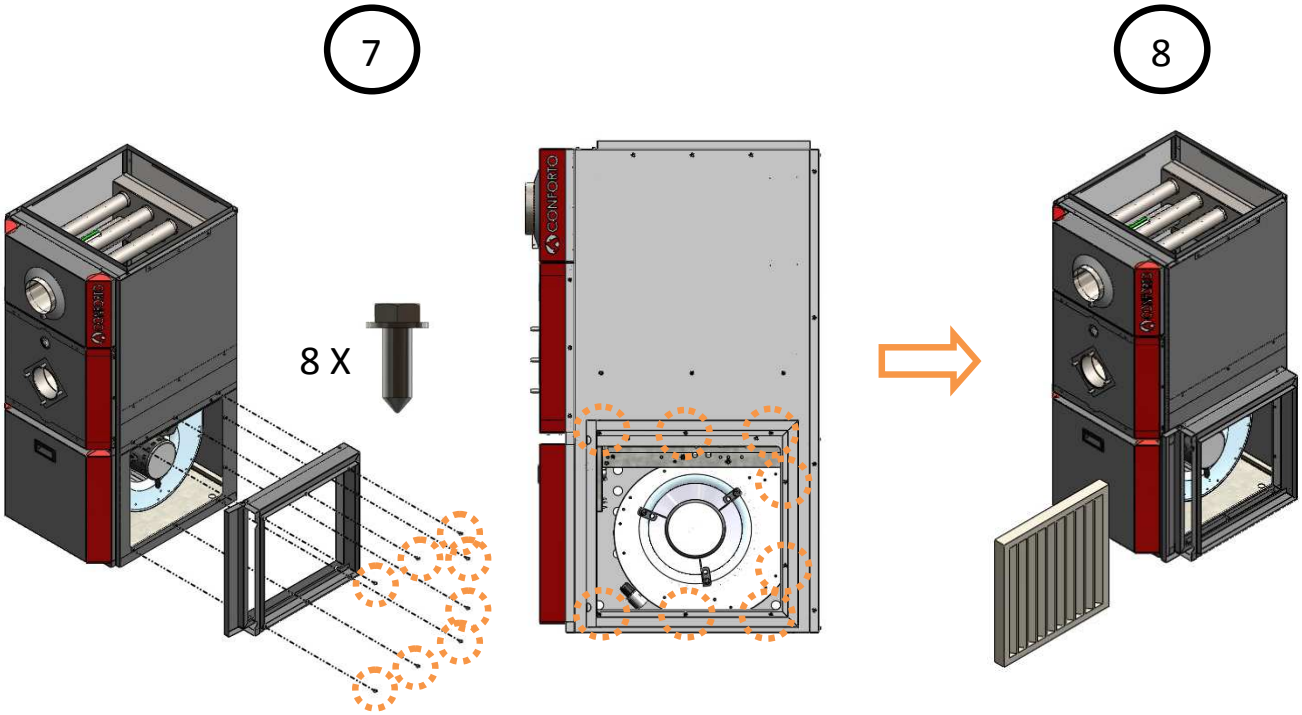
Step 5: Remove the 4 knockouts on the panel (left side, right side or base panel) where you want to install the air filter

Step 6: Cut the panel between the 4 knockouts.



Step 7: Using 8 screws ,install the air filter rack on the furnace.

Step 8: Slide the air filter inside the air filter rack



5.0 BURNER INSTALLATION AND SPECIFICATIONS

5.1 ASSEMBLY & INSTALLATION OF BURNER

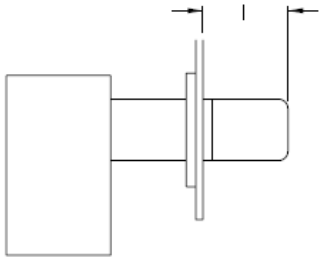
ASSEMBLE Check burner model is correct for furnace rating required. Assemble as per burner manufacturer's instructions.

SELECT NOZZLE Select oil input, nozzle and burner configuration as shown on furnace operating decal.

INSTALL NOZZLE Install selected nozzle, check for clean seating and tighten in nozzle adaptor.

ELECTRODES See burner manufacturer's instructions for correct setting.

INSERTION LENGTH See figure below.



BURNER INSERTION (l)

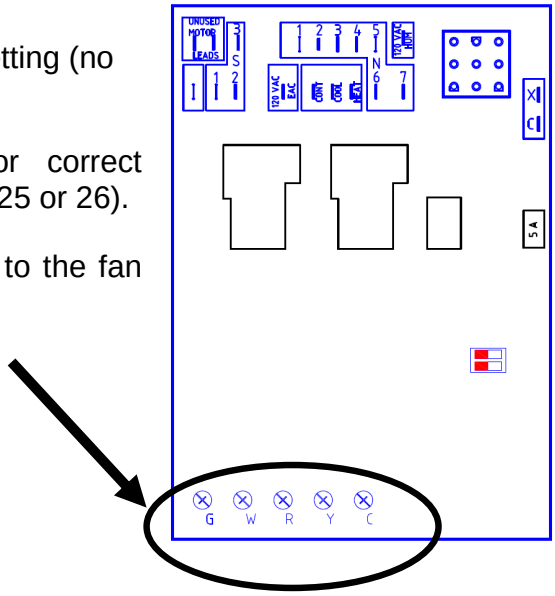
	in	mm
RIELLO	2 1/2	63
BECKETT	2 1/2	63

.

PUMP BY-PASS PLUG For one pipe system factory setting (no plug).

WIRING Refer to wiring diagram for correct burner connections (see page 25 or 26).

THERMOSTAT Connect the thermostat wires to the fan timer control board (ST9103).



5.2 SET BURNER FOR EFFICIENT OPERATION

BURNER SETTINGS Use burner settings in the table on page 16 or operating decal as a guide to set burner, particularly for nozzle change. **Those settings are only starting points for the adjustments and are not meant as final settings.**

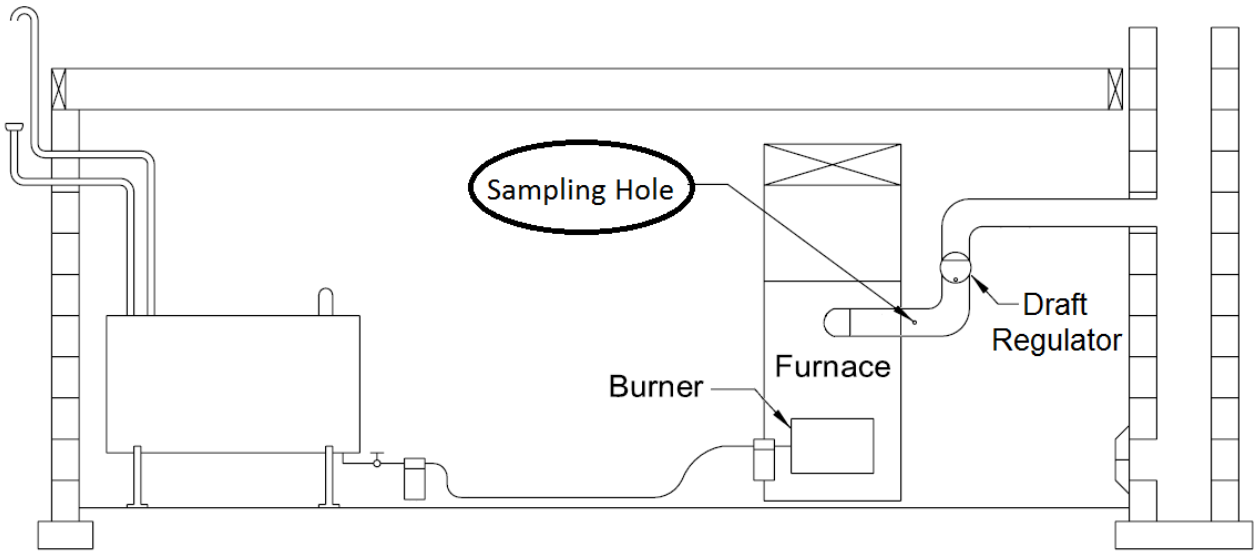
On Beckett AFG burner, make sure the correct retention head and static disk are installed on the burner for the desired firing rate. The head is held in place by two (2) screws at the end of the burner blast tube. In the burner model in the table of page 16, the head is always after the AFG designation and the static disk after the head. For example, the AFG L2 3 3/8 means an AFG chassis burner with a L2 head and a static disk of 3 3/8.

PUMP PRESSURE Refer to the table on page 16 or operating decal.

AIR SETTING Use air settings on page 16 as a guide to set air adjustment. **Those settings are only starting points for the adjustments and are not meant as final settings.**

DRAFT REGULATOR The draft regulator should be installed at least three (3) flue pipe diameters from breeching or elbow of the furnace.

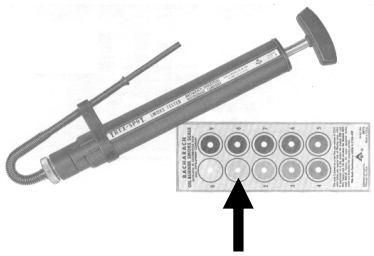
SAMPLING HOLE On smoke/vent pipe, drill a 3/8" round opening. The hole should be at least two (2) flue pipe diameter from breeching or elbow of the furnace.



DRAFT PRESSURE Using an accurate draft meter; adjust the draft control to obtain - 0.01" wc minimum draft pressure at the breech sampling hole. The draft regulator's adjustments should be made after furnace has been running under heating mode for at least five (5) minutes minimum.

COMBUSTION TEST **All your tests must be done with the burner cover on (Riello)**

COMBUSTION SETTING/ EFFICIENCY After 10 minutes of normal operation, take a smoke test and adjust the burner to obtain a reading of "1" on the smoke scale**.** Take a CO_2 test and note the result.

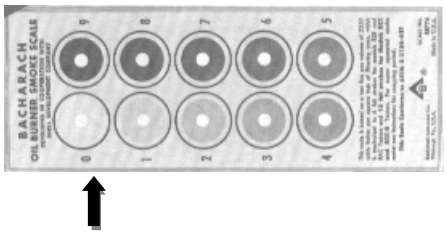


To reach the maximum smoke test value, a 10 full slow steady pump action is required.

Open the air band adjustment on the burner to reduce your CO_2 lecture by 1%.

To reach the maximum CO2 test value, a 18 full slow steady pump action is required.

You now have a perfect "slight trace" of smoke.



Relation between % of CO_2 and O_2

CO_2 (%)	O_2 (%)	Excess Air (%)
13.5	2.6	15.0
13.0	3.3	20.0
12.5	4.0	25.0
12.0	4.6	30.0
11.5	5.3	35.0
11.0	6.0	40.0

5.3 TECHNICAL INFORMATION

KHM Series	KHM-1 / 090			KHM-2 / 140		
Riello Burner	F3			F5		
Unit Model	KHM-E1-*067-03	KHM-E1-*079-03	KHM-E1-*091-03	KHM-E3-*109-05	KHM-E3-*127-05	KHM-E3-*139-05
Firing Rate (USGPH)	0.55	0.65	0.75	0.90	1.05	1.15
Input (BTU/h)	77,000	91,000	105,000	126,000	147,000	161,000
Output (BTU/h)	67,000	79,000	91,000	109,000	126,000	139,000
Nozzle	0.40 70A	0.60 70W	0.65 70W	0.75 80W	0.85 70W	1.00 70W
Pump Pressure (psi)	190	145	145	145	165	145
Turbulator Setting	0	0	0	0	1	2
Air Gate Adjustment	1.75	2	2.35	2	2.25	2.25
Energy Star Approved	YES	YES	YES	YES	YES	YES
AFUE (%)	86.50	86.80	86.30	87.50	86.60	86.90

Beckett Burner	AFG L2 3-3/8			AFG F3 2-3/4		
Unit Model	KHM-G2-*066-03	KHM-G2-*078-03	KHM-G2-*090-03	KLHMG2-*102-05	KHM-G2-*119-05	KHM-G2-*132-05
Firing Rate (USGPH)	0.55	0.65	0.75	0.85	1.00	1.10
Input (BTU/h)	77,000	91,000	105,000	119,000	140,000	154,000
Output (BTU/h)	66,000	78,000	90,000	102,000	119,000	132,000
Nozzle	0.50 60W	0.60 60W	0.65 60W	0.75 70B	0.85 70B	1.00 70B
Low Firing Rate Baffle	YES	YES	YES	YES	YES	YES
Pump Pressure (psi)	145	145	145	145	145	145
Air Band (Gross)	1	1	1	1	2	2
Air Shutter (Fine)	4	6,5	8	7	6	10
Energy Star Approved	YES	YES	YES	YES	YES	YES
AFUE (%)	86.80	86.60	86.00	86.70	86.50	86.40
CO_2 (%)	**12.5**	**13.5**	**13.7**	**12.5**	**13.5**	**13.5**

General Information

PSC motor info

Temperature Rise (℉)	40 – 70	40 – 70	50 – 80	40 – 70	40 – 70	50 – 05
Blower Speed (0.2'' wc)	M-LOW	M-HIGH	M-HIGH	M-LOW	M-HIGH	M-HIGH
Blower Speed (0.5" wc)	M-HIGH	M-HIGH	HIGH	M-HIGH	HIGH	HIGH

Energy Star ECM motor (0.2'' wc to 0.5'' wc static pressure)

Temperature Rise (℉)	50-80	55-85	60-85	52-85	55-85	55-85
Blower Speed	M-LOW	M-LOW	MEDIUM	M-LOW	MEDIUM	M-HIGH

Static Pressure at 0.2" WC / 0.5" WC

Blower	PSC 1/2 hp		PSC 3/4 hp	
Speed	0.2" wc	0.5" wc	0.2" wc	0.5" wc
HI	1375	1275	2120	2030
MHI	1250	1170	1940	1875
MED	---	---	---	---
MLO	1100	1075	1710	1650
LO	875	850	1150	1050

Blower	ECM 1/2 hp		ECM 3/4 hp	
Speed	0.2" wc	0.5" wc	0.2" wc	0.5" wc
HI	1300	1230	2000	1910
MHI	1225	1160	1900	1835
MED	1140	1050	1690	1660
MLO	1025	980	1610	1575
LO	775	750	1060	1010

(*) In the Unit Model number, is specific information of the product for administration only

6.0 FURNACE OPERATION AND SETTINGS

SHUTTING FURNACE DOWN

POWER OFF Turn off main power breaker or disconnect.

FUEL OFF Shut off manual fuel supply valve.

Always keep manual fuel supply valve shut off if the burner is shut down for an extended period of time.

RESTARTING FURNACE

Follow this procedure before restarting a unit that has been shut down for an extended period of time.

INSPECTION Have the furnace/system serviced and inspected by a qualified technician.

FUEL Turn on fuel supply and check that there are no leaks.

POWER Turn on power and check that the furnace starts and operates as usual.

OPERATION If the furnace/system fails to operate or operates in an unusual manner, call your service technician. If the burner fails to operate at any time, call a qualified burner technician.

6.1 BLOWER SETTING

Ensure power is off when adjusting blower setting. For heating, use the blower speeds shown on the furnace specifications to give a temperature rise according to tables on page 16. The Lo blower speed can be used for air circulation when neither heating nor cooling are required. Set blower speeds to match the installation requirements.

THERMOSTAT ANTICIPATOR SETTING

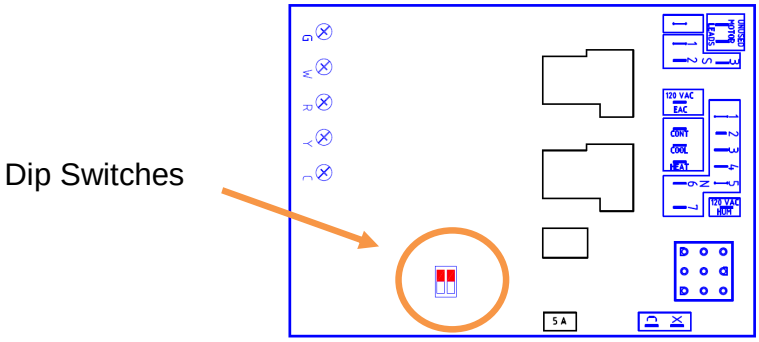
Adjust to thermostat manufacturer's instruction.

FAN & LIMIT CONTROL

Limit	185℉ (Factory set)
Fan On	45 seconds after burner stats
Fan Off	Adjustable on fan control board (see page18)

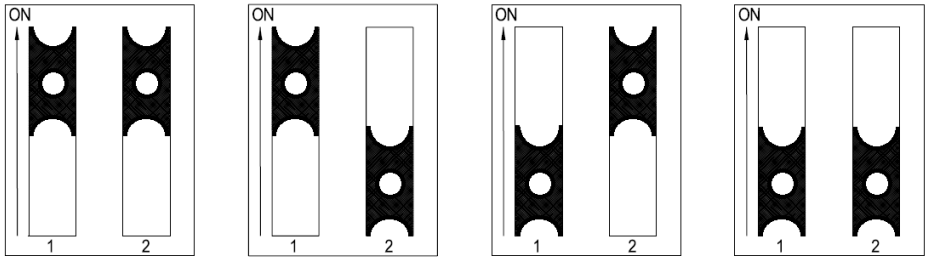
6.2 FAN TIMER CONTROL BOARD (ST9103A 1028)

- “FAN OFF” Dip Switches adjustment



COMFORT ADJUSTMENTS

- Outlet air consistently too warm or too cold - change the blower motor speed to give the specified air temperature rise.
- Outlet air gets too warm and burner shuts down - increase air by changing the blower motor speed to give the specified temperature rise.
- Outlet air is too cold or too warm at the end of the heating cycle after the burner has turned off - adjust the “FAN OFF” dip switch on electronic fan center. Refer to the next figure.



“FAN OFF” Dip Switch

OFF CYCLE AIR CIRCULATION

LOW SPEED All **KHM** models have the **low** speed switch for optional constant air circulation during the furnace off cycle.

“FAN ON” When “FAN ON” is selected on the thermostat, the blower will run constantly at the blower speed selected on the heating terminal. This is the equivalent of jumping terminals R and G on the ST9103 board.

6.3 ST9103A 1028 CONTROL BOARD SEQUENCE

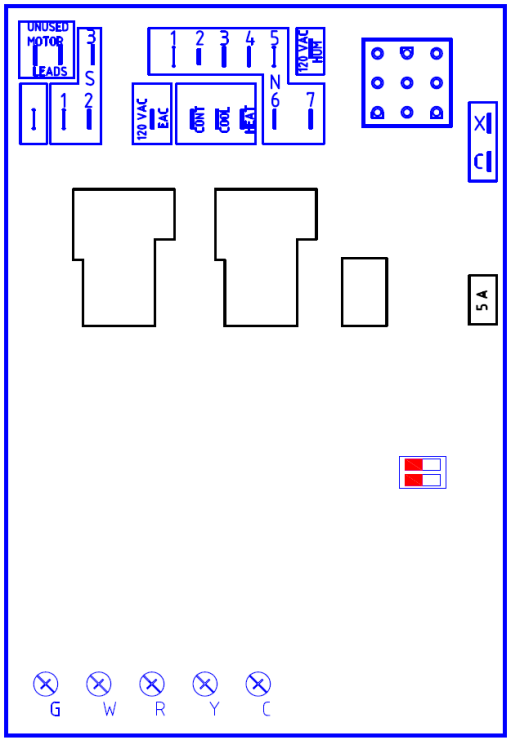
ST9103 Heating Sequence

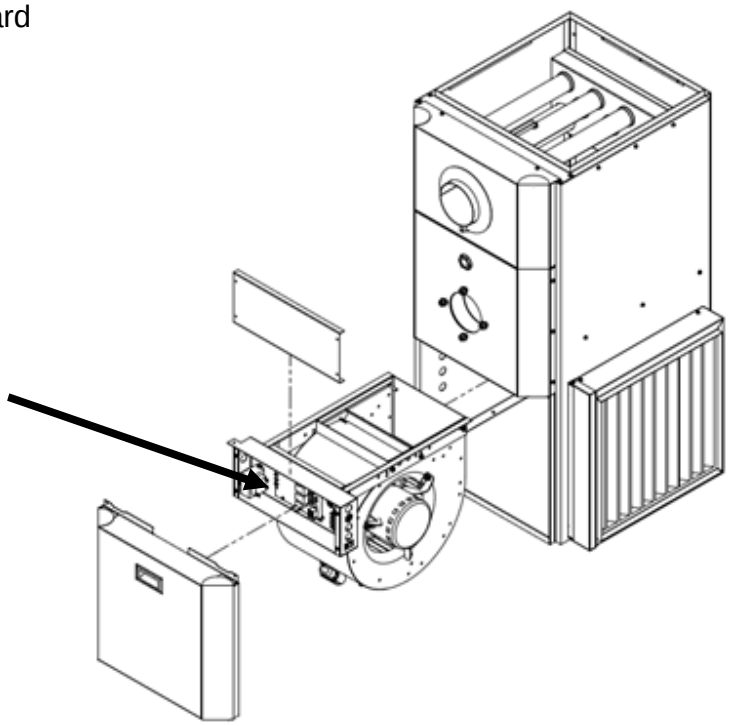
1) Thermostat calls for Heat.
2) Burner starts
3) Blower starts after **45** seconds
4) Burner shuts down after call for heat is satisfied
5) Blower stops according to adjusted (FAN OFF) Dip switch selection

ST9103 Cooling Sequence

1) Thermostat calls for cooling
2) Blower starts immediately
3) Cooling unit starts
4) Blower stops immediately after cooling demand is satisfied
5) Cooling unit stops

Honeywell ST9103A 1028 Electronic Board

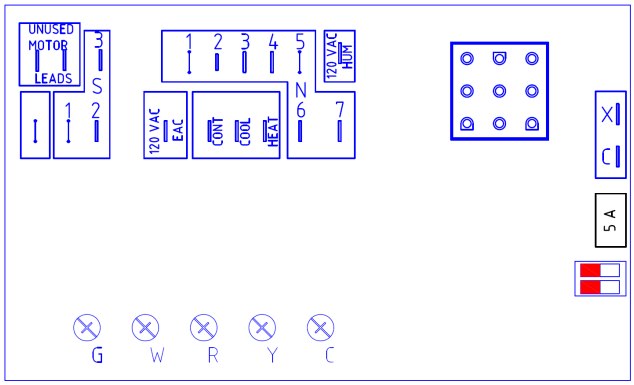




6.4 SERVICING - FAN TIMER ST9103A 1028

Trouble shooting the electronic board ST 9103

Before trouble shooting the board, check for the 5 amp. fuse



For accurate trouble shooting, follow step by step the Trouble Shooting Chart.

Step	Possible Cause	Check-out procedure	Corrective action
		No Heat	
1	Incoming supply	Check for 120 Volts between terminal S2 and 3 on electronic fan control	**Yes - Move to next step** No - Check breaker main power switch
2	Transformer	Check for 120 Volts between terminal S3 and 4 on electronic fan control. Check for 24 Volts between terminal X and C on electronic fan control	**Yes - Move to next step** No - Check for bad connection **Yes - Move to next step** No - Change Transformer
3	Electronic Fan control	Check for 24 Volts between R and C Check for 24 Volts between terminal W and C	**Yes - Move to next step** No - Change the electronic board **Yes - Move to next step** No - Check thermostat and wiring
4	**Warning: Make sure the quick connect cable is fully inserted on the board**		
	Limit Control	Check for 120 Volts on each terminal of the two limits Check for 120 Volts coming from the main plug-in of the electronic fan control to the limit control Check for 120 Volts coming out of the limit control	**Yes - Move to step # 5** No - Move to next step **Yes - Move to next step** No - Change the electronic fan control **Yes - Move to step # 5** No - Failure on the limit control circuit . Temperature too high . Bad limit control

Step	Possible Cause	Check-out procedure	Corrective action
No Heat			
5 A	Riello burner application	Check for 120 Volts on the black wire, contact (COM) on the Riello burner relay kit. Check if oil primary control is on reset Check for continuity between the two wires yellow and violet on the Riello burner relay kit Check for 120 Volts on the contact (No) of the Riello burner relay kit Check for 120 volts on the orange wire coming to the burner (L)	**Yes - Move to next step** No - Back to step # 4 or check for bad connection **Yes - Press reset button** No - Move to the next step **Yes - Move to next step** No - Change the electronic fan control **Yes - Move to next step** No - Change the Riello burner relay kit **Yes - Failure on the burner** No - Change the electronic fan control
5 B	Beckett Burner application	Check for 120 Volts on the black wire terminal strip (mid terminal) Check if oil primary control is on Reset Check for continuity between the two wires black and gray (TT) on primary control Check for 120 Volts coming from the electronic fan control to the primary control (black wire) Check for 120 Volts coming from the primary control (orange wire) to the transformer, motor and the electronic board	**Yes - Move to next step** No - Back to step # 4 or check bad connection **Yes - Press reset button** No - Move to the next step **Yes - Move to next step** No - Change the electronic fan control **Yes - Move to next step** No - Change the electronic board **Yes - Failure on the burner** No - Change the primary control
6	Blower ▪ Low speed Check if the constant low speed switch is **ON**	Check for 120 Volts at the "CONT" terminal on the electronic fan control Check for 120 Volts on both side of the constant low speed switch	**Yes - Move to next step** No - Change the electronic fan control **Yes - Check "LOW" speed on the blower motor** No - Change the switch

Step	Possible Cause	Check-out procedure	Corrective action
No Cooling			
7	Blower High speed	Check for 24 Volts between G and C on electronic fan control Check for 120 Volts at the "COOL" terminal of the electronic fan control	**Yes - Move to next step** No - Check thermostat and wiring; if it's OK, then change the electronic fan control **Yes - Check "COOL" speed on the blower motor** No - Change the electronic fan control
Step	**Possible Cause**	**Check-out procedure**	**Corrective action**
Electronic air filter and Humidifier			
8	Condensing unit	Check for 24 volts between terminal Y and C on the electronic fan control	**Yes - Compressor ON** No - Check thermostat and wiring
9	Electronic air filter	Check for 120 Volts on terminal "EAC" of the electronic fan control (thermostat must call a Heat, Cool or Fan ON demand	**Yes - Electronic filter failure** No - Change the electronic fan control
10	Humidifier	Check for 120 Volts on terminal "HUM" of the electronic fan control (burner must be energized)	**Yes - Humidifier failure** No - Change the electronic fan control

7.0 SERVICE

REGULAR MAINTENANCE

Check complete operation **at least once a year**. In Canada see B139, (Maintenance), in United States see NFPA 31, for recommended servicing procedure. Clean flue pipes on a regular basis. Replace flue pipes if there is any sign of corrosion or other problems. Gaskets should be checked and may have to be replaced.

CHANGING NOZZLE

It is recommended that the nozzle be replaced once a year. If a new nozzle of a different size is installed, change the blower speed according to section **BURNER INSTALLATION AND SPECIFICATIONS** (see table at page 14) or operating decal as required

CLEANING HEAT EXCHANGER

Heat exchanger must be inspected every heating season. Refer to instructions and pictures below.

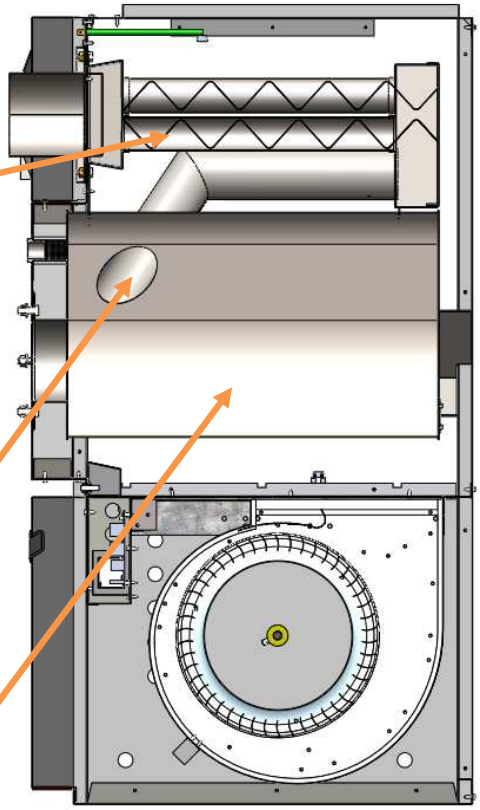
Step 1:
Remove the breech plate

Step 2:
Remove the baffles and clean the round tubes if needed (use a 2'' diameter brush)

Step 3:
Remove the burner

Step 4:
Clean the transitions tubes if needed

Step 5:
Clean the combustion chamber if needed



AIR FILTERS

To maintain furnace performance and safety, replace dirty filters as required or at least once every heating season or as required. Use new approved disposable filters of the same size and type. Dirty, clogged or wrong sized filters will impair the furnace performance and may cause the furnace to shut down or overheat

BLOWER REMOVAL

This furnace has a blower sealing system, which is designed to be tight and rattle free. Refer to the instructions and pictures below.

1) Shut off oil and power to furnace.
2) Remove the two (2) screws securing the blower door (Figure 1).
3) Open blower compartment (Figure 2).
4) Disconnect the wiring to the blower motor.
5) Remove the screw securing the blower side to the separating panel (Figure 3).
6) Slide the blower toward you and get the blower out of the furnace (Figure 4).

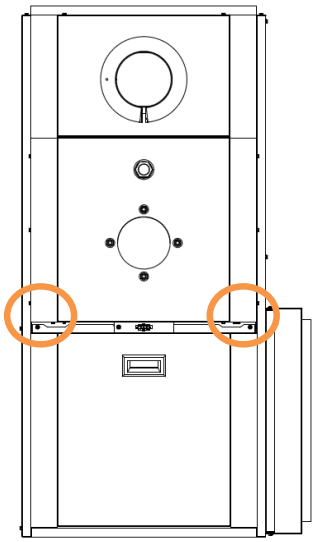


Figure 1

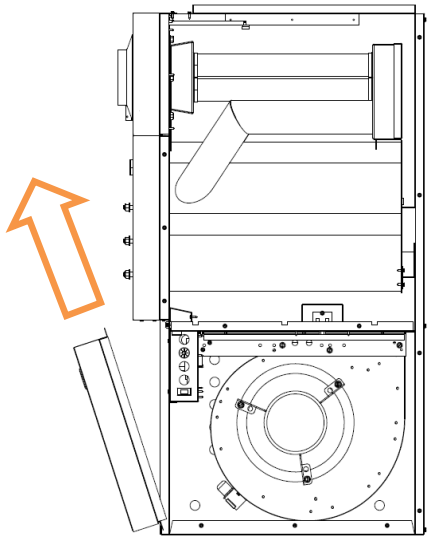


Figure 2

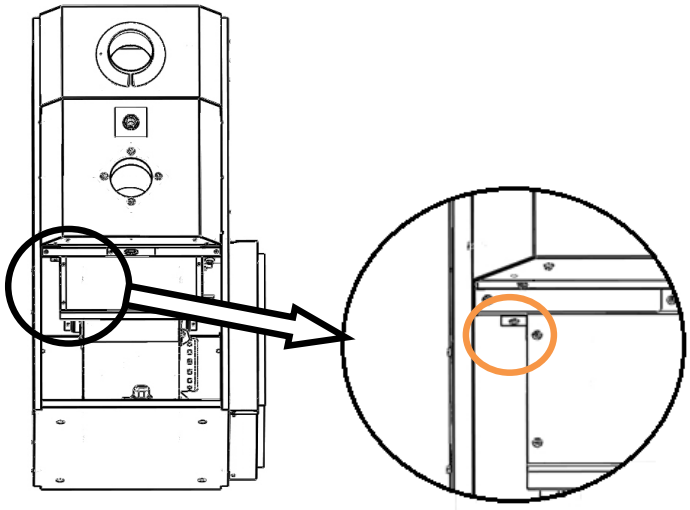


Figure 3

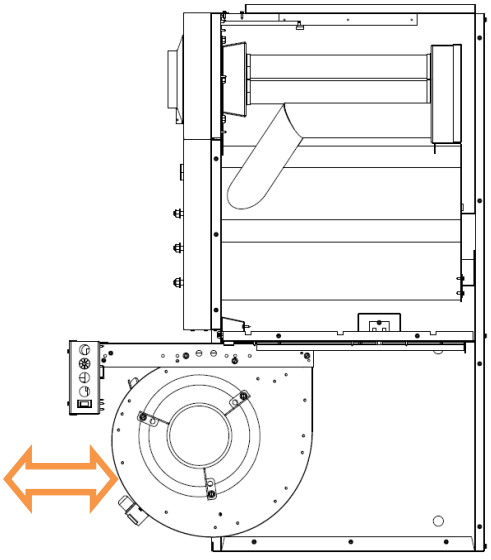
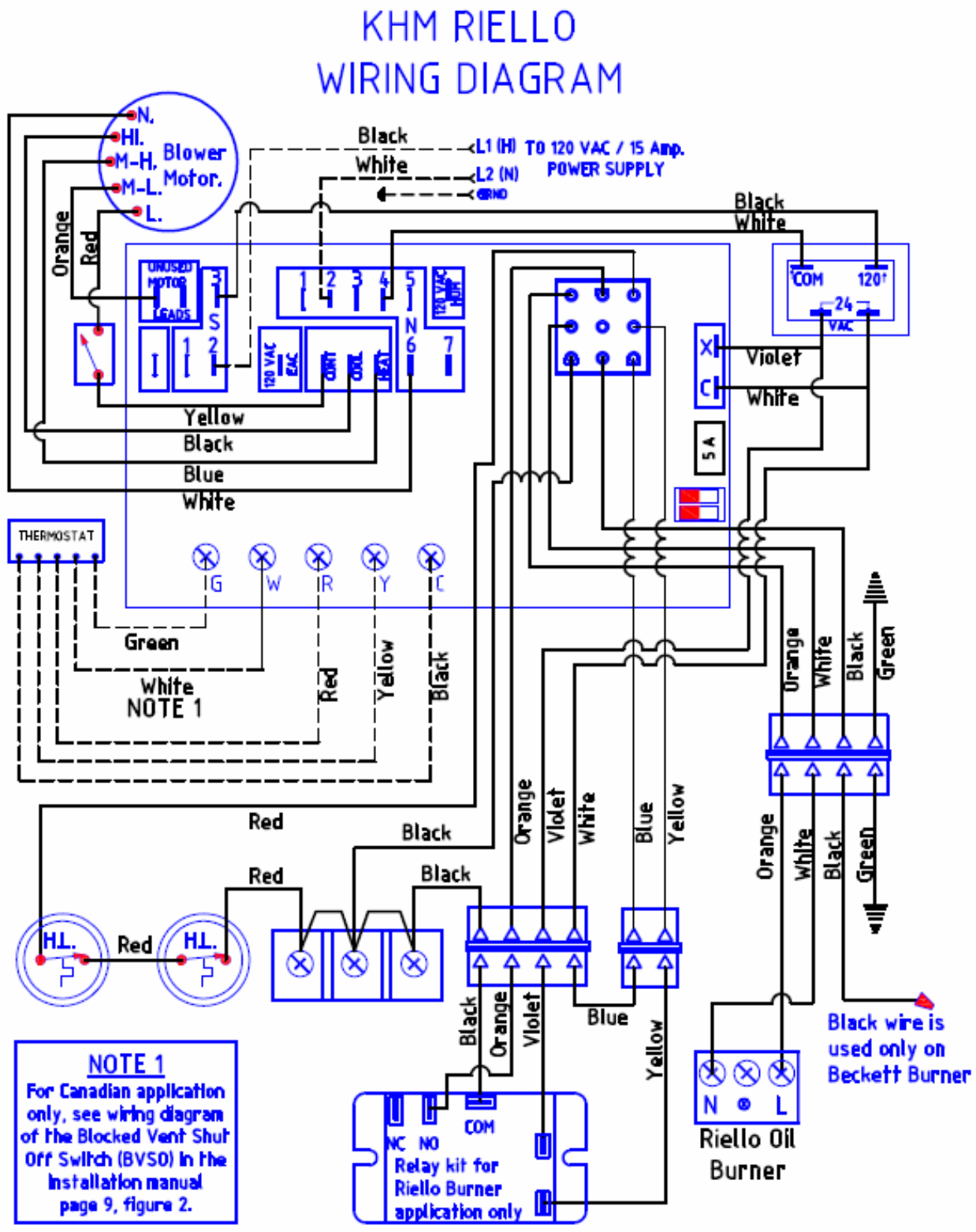
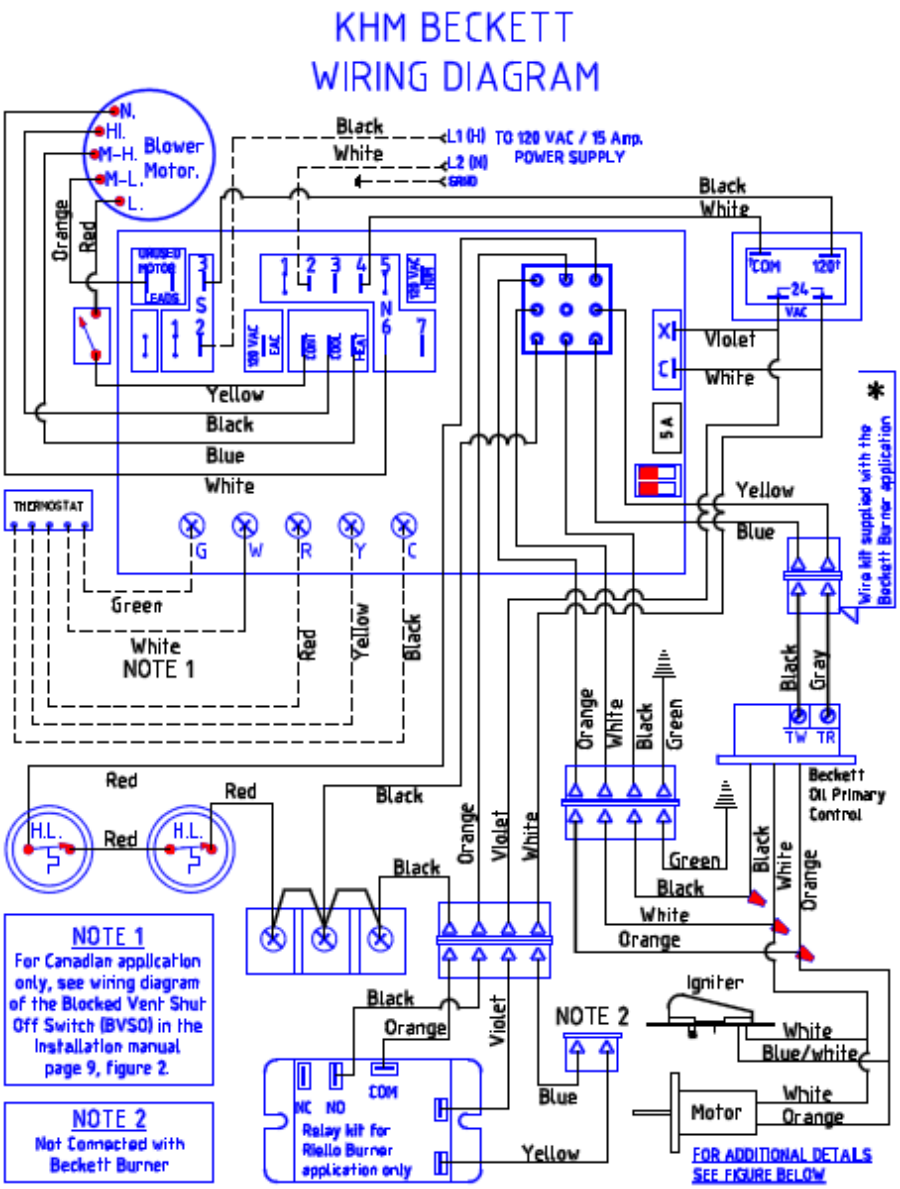


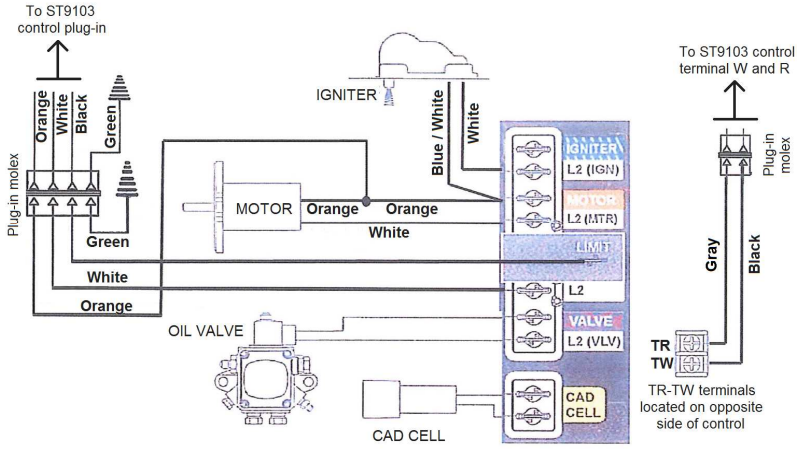
Figure 4

8.0 ELECTRICAL / WIRING DIAGRAMS





*** Transforming the electric box for a Beckett burner application, see page 27**

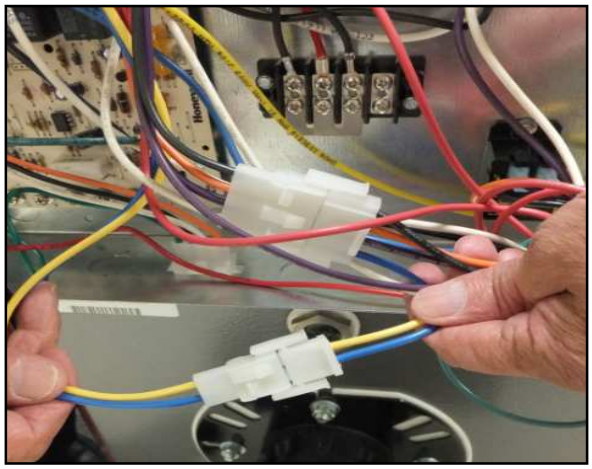


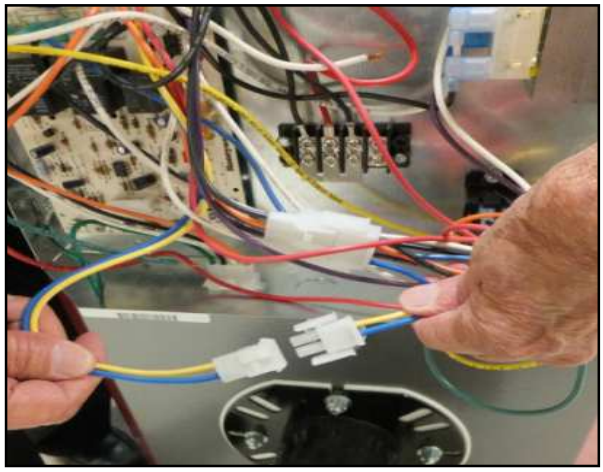
GeniSys control schematic with the ST9103 Board

Electric box with a Beckett burner application

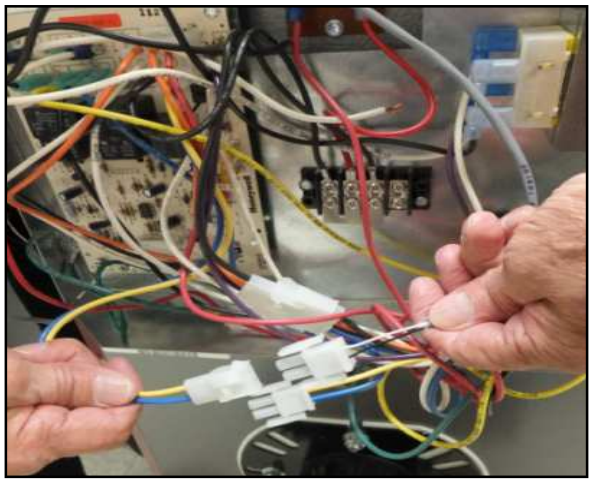
Transforming the factory assembly Riello electric box

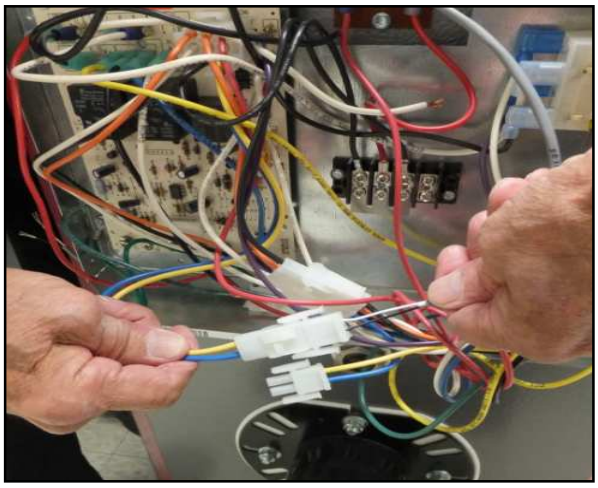
to a Beckett electric box





STEP 1 : Locate and disconnect the 2-pin Molex connector.



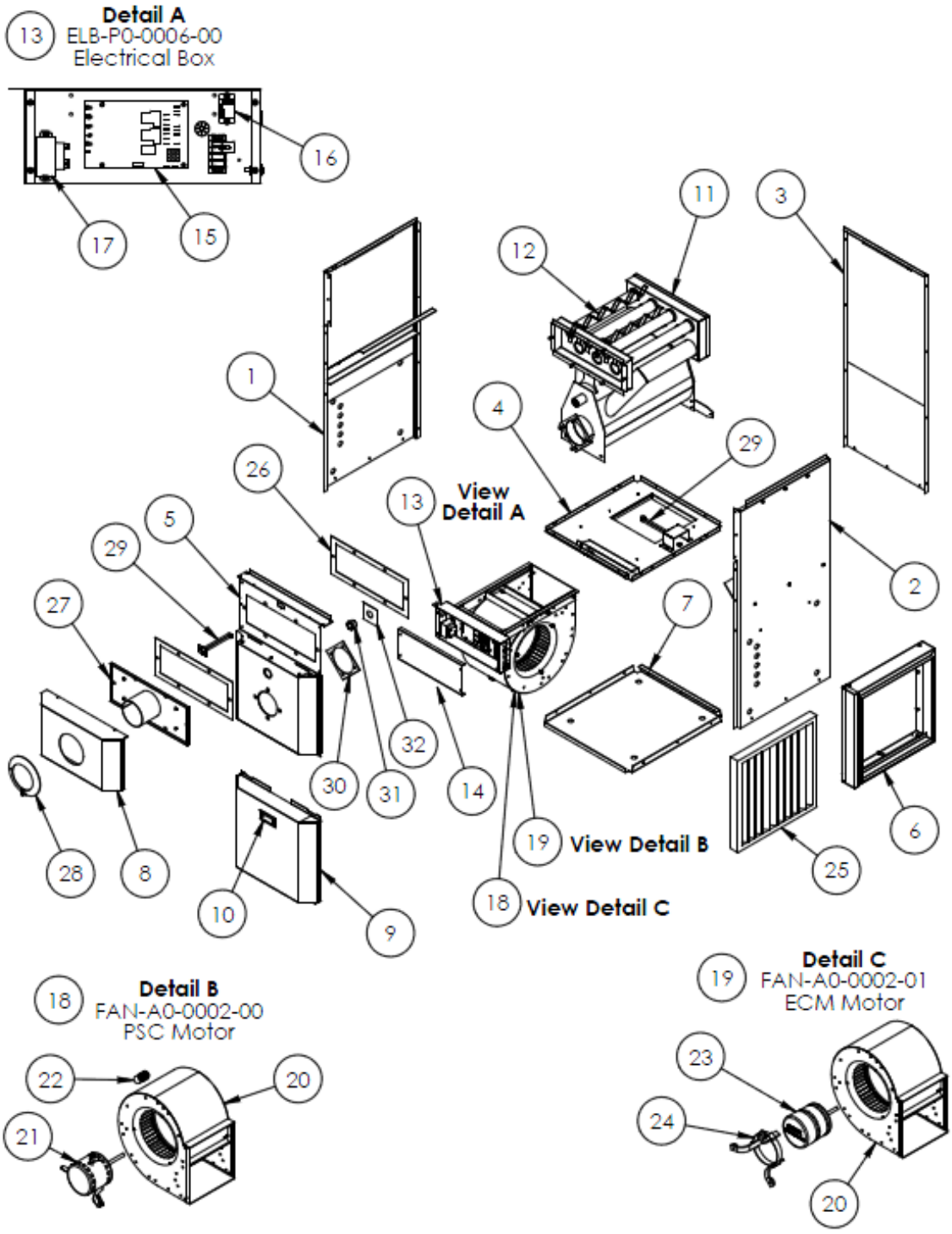


STEP 2 : Connect the 2-pin connector to the 2-pin harness provided in the Beckett burner box.

STEP 3 : Connect the 2 wires (black and grey) of the 2-pin harness to the TW and TR connection on the GeniSys primary control

9.0 EXPLODED PARTS VIEW

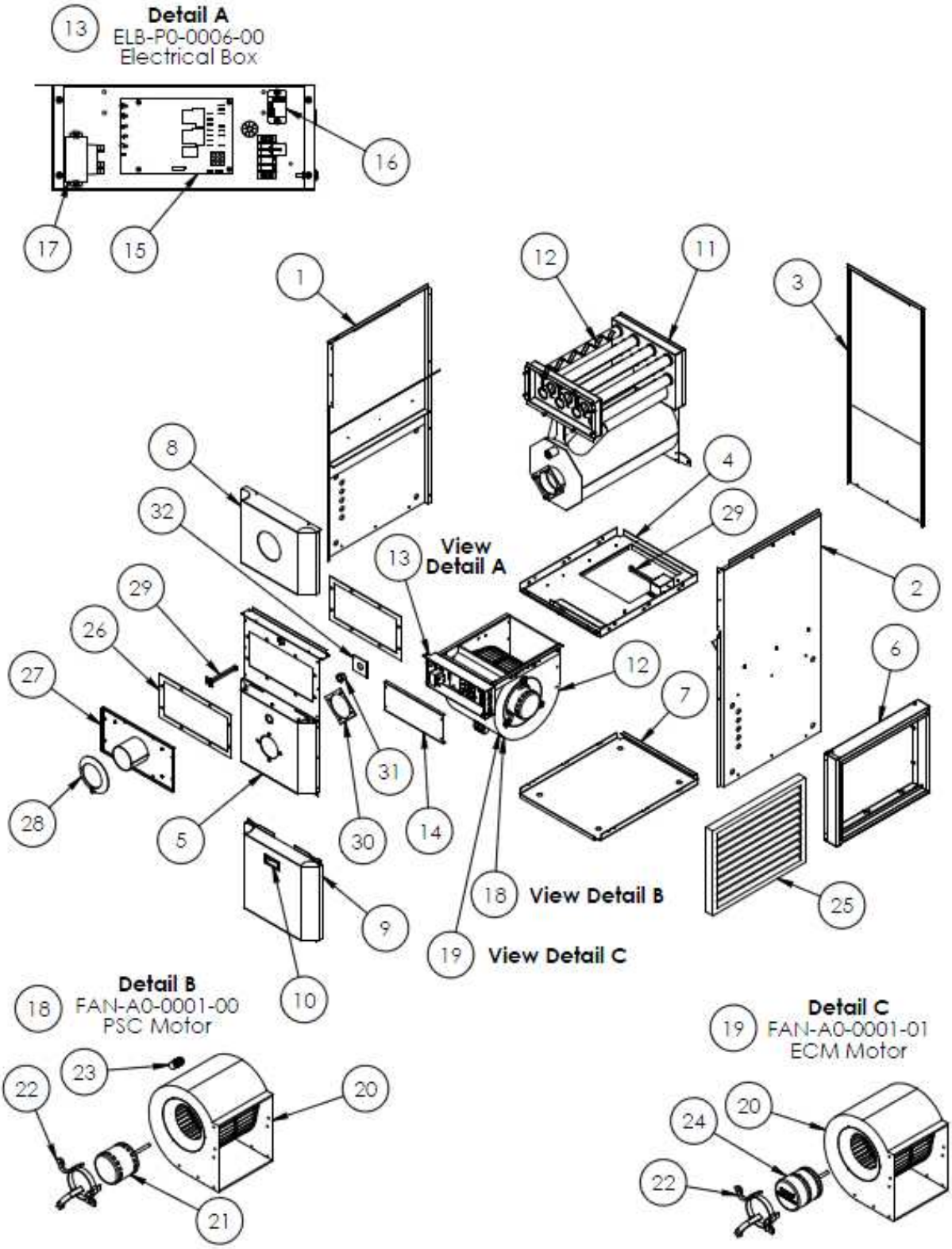
KHM-1 / 090 – Exploded Parts View



KHM-1 / 090 – Part List

ITEM	PART NUMBER	DESCRIPTION	QTY
1	CAB-A0-0019-00	Left Panel Assembly	1
2	CAB-A0-0020-00	Right Panel Assembly	1
3	CAB-A0-0018-00	Rear Panel Assembly	1
4	CAB-A0-0016-00	Blower Panel Assembly	1
5	CAB-A0-0021-00	Front Panel Assembly	1
6	CAB-A0-0022-00	20'' x 20'' Filter Holder Assembly	1
7	CAB-P0-0045-00	Base Panel	1
8	CAB-P0-0052-00	Front Door Panel	1
9	CAB-P0-0051-00	Blower Door Panel	1
10	3HN-00-PULL-00	Handle Flush Pocket Pull	1
11	HEX-A0-0009-00	Heat Exchanger Assembly	1
12	HEX-P0-0064-00	Pipe Baffle Hi-Boy	7
13	ELB-A0-0006-00	Electrical Box Assembly - Hi-Boy Model	1
14	ELB-P0-0014-00	Cover Electric Box - Hi-Boy Model	1
15	4CB-00-FAN0-00	ST9103A1028 Electronic Board	1
16	4RY-00-24V0-00	Relay AE04001 24VAC Form C SPDT 24V	1
17	4TF-00-40VA-00	Transformer HTC-01A0BB01 40 VA	1
18	FAN-A0-0002-00	Fan Motor Assembly KLR-090 PSC Motor	1
19	FAN-A0-0002-01	Fan Motor Assembly KLR-090 ECM Motor	1
20	3BU-10-08DD-00	Blower 10" x 8" Direct Drive (G10-8DD)	1
21	3BM-50-4SDD-01	Motor Blower 1/2 HP Direct Drive 4SP EMERSON	1
22	4CA-00-705M-00	Capacitor 7.5 µF 370VAC 70C 60 Hz	1
23	3BM-50-ECM0-02	Motor Blower 1/2 HP ECM Ecotech EMERSON	1
24	1SB-00-BUMR-00	Bracket Motor Mounting Direct Drive Blower	1
25	3AF-02-2020-01	Filter Air 20" x 20" x 2" Non-Pleated (Strata Type)	1
26	INS-P0-0015-00	Low-Boy Rear Insulation	2
27	HEX-A0-0013-00	Front Collector Assembly	1
28	CAB-P0-0121-00	Front Flue Collar	1
29	4SD-00-0185-00	Control Limit Snap Disc (185°) Au to Reset (L185-40F)	2
30	INS-P0-0017-00	Burner's Flange Insulation	1
31	3SG-0P-1030-5A	Glass Sight Clear 1" NPT Hex With THD Seal	1
32	INS-P0-0018-00	Sight Glass Insulation	1

KHM-2 / 140 – Exploded Parts View



KHM-2 / 140 – Part List

ITEM	PART NUMBER	DESCRIPTION	QTY
1	CAB-A0-0027-00	Left Panel Assembly	1
2	CAB-A0-0028-00	Right Panel Assembly	1
3	CAB-A0-0026-00	Rear Panel Assembly	1
4	CAB-A0-0024-00	Blower Panel Assembly	1
5	CAB-A0-0029-00	Front Panel Assembly	1
6	CAB-A0-0030-00	20'' x 25'' Filter Holder Assembly	1
7	CAB-P0-0061-00	Base Panel	1
8	CAB-P0-0065-00	Front Door Panel	1
9	CAB-P0-0051-00	Blower Door Panel	1
10	3HN-00-PULL-00	Handle Flush Pocket Pull	1
11	HEX-A0-0011-00	Heat Exchanger Assembly	1
12	HEX-P0-0064-00	Pipe Baffle Hi-Boy	11
13	ELB-A0-0006-00	Electrical Box Assembly - Hi-Boy Model	1
14	ELB-P0-0014-00	Cover Electric Box - Hi-Boy Model	1
15	4CB-00-FAN0-00	ST9103A1028 Electronic Board	1
16	4RY-00-24V0-00	Relay AE04001 24VAC Form C SPDT 24V	1
17	4TF-00-40VA-00	Transformer HTC-01A0BB01 40 VA	1
18	FAN-A0-0001-00	Fan Motor Assembly KHM-140 PSC Motor	1
19	FAN-A0-0001-01	Fan Motor Assembly KHM-140 ECM Motor	1
20	3BU-12-00DD-00	Blower 12" Direct Drive (GT12-10DD)	1
21	3BM-75-4SDD-01	Motor Blower 3/4 HP Direct Drive 4SP EMERSON	1
22	1SB-00-BUMR-00	Bracket Motor Mounting Direct Drive Blower	1
23	4CA-00-156M-2B	Capacitor 15 µF 370VAC 70C 60 Hz	1
24	3BM-75-4SDD-02	Motor Blower 3/4 HP ECM Ecotech EMERSON	1
25	3AF-02-2025-01	Filter Air 20" x 25" x 2" Non-Pleated (Strata Type)	1
26	INS-P0-0020-00	Hi-Boy Front Insulation	2
27	HEX-A0-0010-00	Front Collector Assembly	1
28	CAB-P0-0121-00	Front Flue Collar	1
29	4SD-00-0185-00	Control Limit Snap Disc (185°) Au to Reset (L185-40F)	2
30	INS-P0-0017-00	Burner's Flange Insulation	1
31	3SG-0P-1030-5A	Glass Sight Clear 1" NPT Hex With THD Seal	1
32	INS-P0-0018-00	Sight Glass Insulation	1

10. START-UP TEST RESULTS

Model**:** _____ Serial Number: _____

Unit configuration: Upflow____ Downflow_____ Horizontal left_____ Horizontal right_____

Date of installation: _____

Installer (name & address): _____

_____

_____

START-UP TEST RESULTS

Size of unit (Btu/h): _____

Nozzle: _____Oil Pressure (psi): _____

Chimney_____ Direct vent system (DVS) _____

Burner adjustments:

RIELLO **F3**___ RIELLO **F5**___ BECKETT **AFG L2**___ BECKETT AFG **F3**____

Turbulator: _____ Air band: _____

Air Gate: _____ Air shutter_____

Smoke result: #0 _____ TRACE _____ #1 _____

Combustion Results: _____ CO_2 %

Chimney draft: _____ " W.C.

Ambient temperature: _____ ℉

Gross flue temperature: _____ ℉

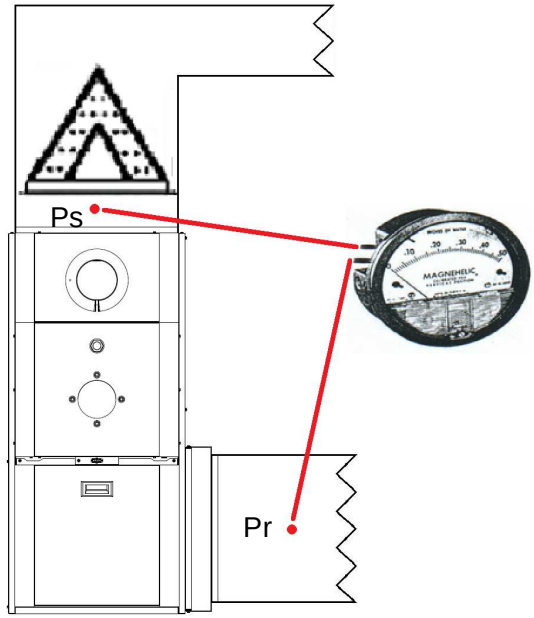
Temperature rise: _____ ℉ (see page 33)

External total static pressure: _____ " W.C. (see page 33)

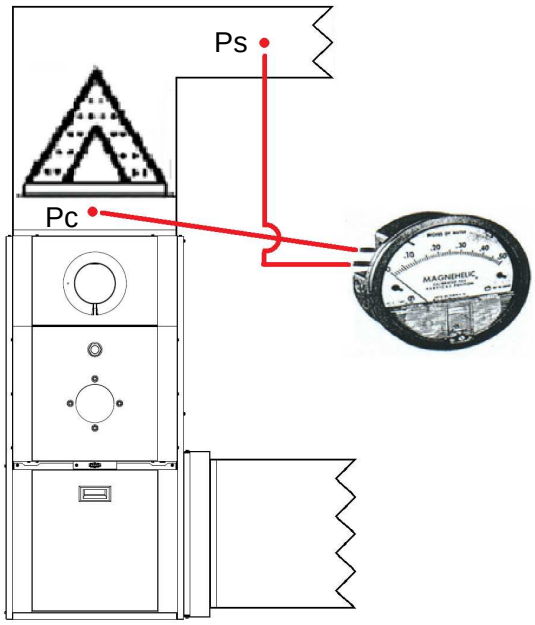
A/C Coil total resistance: _____ " W.C. (see page 33)

TEST PROCEDURES

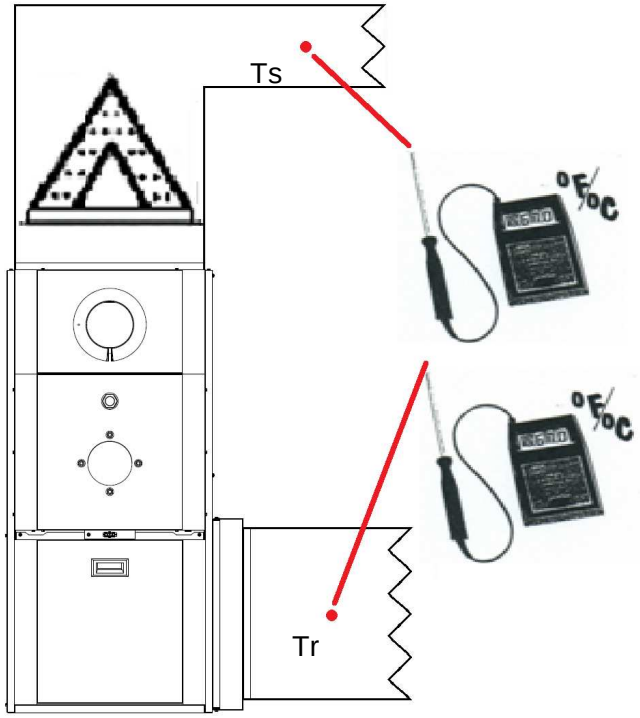
External Total Static Pressure Reading
Supply Pressure (Ps) + Return Pressure (Pr)



A/C Coil Total Resistance Reading
Coil Pressure (Pc) - Supply Pressure (Ps)



Temperature Rise Reading ***
Supply Temp. (Ts) - Return Temp. (Tr)



*** Probe must not be in direct sight of heat exchanger.

Granby Furnaces Inc. manufactures a full line of oil-fired furnaces in its 70,000 square feet facility. Granby products are sold across Canada and the United States through a distribution network.

Our team of engineers, designers and technicians continually research and develop products to go beyond the demanding specifications of today's certifications.

Thank you for choosing Granby.